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To:

KINZER, Dwight, Eric
3044 34th Street S.W.
Fargo, ND 58103
ETATS-UNIS D'AMERIQUE

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Applicant KINZER, Dwight, Eric			

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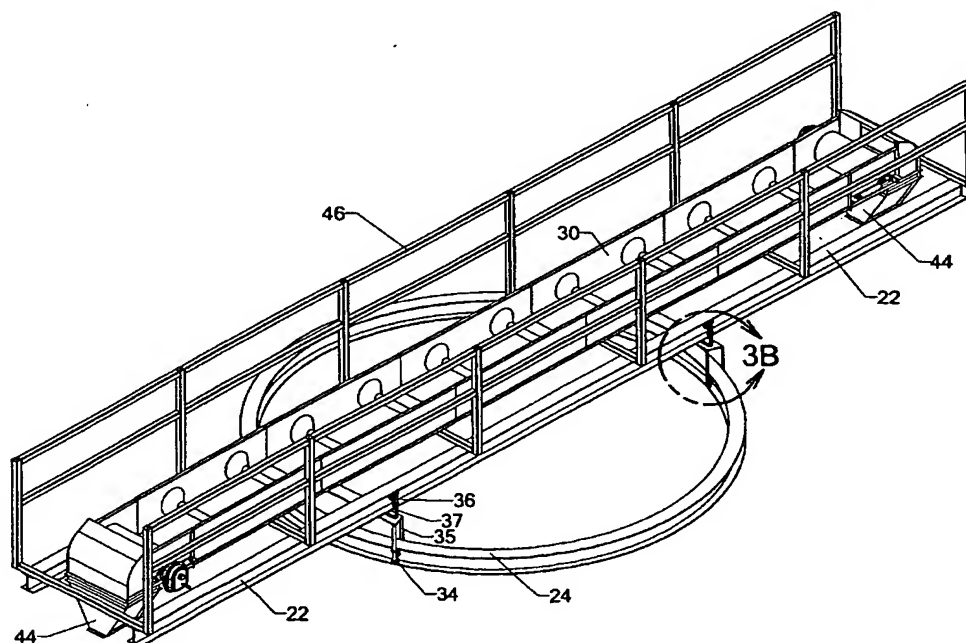
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(71) Applicant and
(72) Inventor: KINZER, Dwight, Eric [US/US]; 3044 34th
Street S.W., Fargo, ND 58103 (US).

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(54) Title: CONVEYING SYSTEM FOR FILLING MULTIPLE STORAGE BINS



(57) Abstract: A conveying system for distributing material into any bin in a horizontal array of storage bins comprise a circular guide positioned over the array of bins (24), a linear guide (22) that rotates along the circular guide, and a conveyor (30) that is supported by the linear guide. By rotating the linear guide and attached conveyor along the circular guide and by shuttling the conveyor linearly, the conveyor has an infinite number of discharge points to fill any one of the underlying array of bins.

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AMENDED CLAIMS

received by the International Bureau on 22 September 2004 (22.09.2004)
original claims 1-20, replaced by new claims 1-35 (9 pages).

CLAIMS: I claim:

1. A conveyor guidance system for distributing material into a plurality of storage receptacles in a horizontal array, comprising:
 - a substantially horizontally oriented circular guide means supported above said receptacles, said circular guide means having a predetermined diameter;
 - a substantially horizontally oriented linear guide means extending at least the length of said predetermined diameter of said circular guide means and mounted to rotate thereon, and
 - a substantially horizontally oriented conveying means mounted to linear guide means for moving linearly, said conveying means having at least one discharge end,said circular guide means comprising at least one circular track and a first trolley means, said first trolley means comprising at least two wheels, each said wheel connecting to at least one rod, and at least one load bar supporting said rod, at least one of said rods being parallel to circular guide axis, and at least one of said rods being perpendicular to circular guide axis,
said linear guide means comprising at least one linear horizontal track and a second trolley means, said second trolley means comprising at least one wheel connected to at least one rod and at least one load bar supporting said rod,
said load bar of said first trolley means supporting said second trolley means, said second trolley means being attached substantially perpendicularly to said first trolley means, said load bar of said second trolley means supporting said linear guide means, said first trolley means being movable along said circular guide means, said linear guide means being movable along said second trolley means, and said conveying means being mounted on said linear guide means.
whereby by adjusting said circular guide means and said linear guide means, said conveying means can distribute said material to any of an infinite number of discharge points above said receptacles, with minimal energy inputs and amount of linear meters of horizontal conveyor.
2. The conveyor guidance system of claim 1, further including a first control means for achieving rotation of said linear guide system along said circular guide system, and a second control means for achieving linear movement of said conveying means.

3. The conveyor guidance system of claim 1 wherein said conveying means comprises at least one conveyor, said conveyor being reversible, such that either end can serve as a discharge end.
4. The conveyor guidance system of claim 1 wherein said conveying means comprises at least one conveyor, said conveyor being uni-directional, such that one end serves as a discharge end and the other end serves as a tail end.
5. A horizontally-oriented, rotating and translating conveying system with an infinite number of discharge points for distributing material to a plurality of horizontally arrayed storage receptacles, comprising:
 - at least one circular guide system having a first trolley means, said circular guide system comprising at least one circular track,
 - at least one linear guide system, said linear guide system mounted on said first trolley means, said linear guide system comprising a plurality of parallel linear tracks and a second trolley means connecting to said parallel linear tracks, and
 - said first and second trolley means further comprising wheels with rods, said rods connecting to wheels, said trolley means further comprising load bars, said load bars supporting said rods, said load bar from said first trolley means supporting said linear tracks, said load bar from said second trolley means supporting said conveying means.
 - said circular guide means further comprising at least one circular track, and a first trolley means, said first trolley means further comprising at least two wheels, at least one rod, each said wheel connecting to at least said one rod, and at least one load bar supporting said rod, at least one of said rods being parallel to circular guide axis, at least one of said rods being perpendicular to circular guide axis,
 - said linear guide means comprising at least one linear horizontal track and a second trolley means, said second trolley means each comprising at least one wheel connecting to at least one rod, and at least one load bar supporting said rod,
 - said load bar of said first trolley means supporting said second trolley means, said second trolley means being attached substantially perpendicularly to said first trolley means, said load bar of said second trolley means supporting said linear guide means, said first trolley means being movable along said circular guide means, said linear guide means being movable along said second trolley means, and said conveying means being mounted on

said linear guide means.

at least one horizontal conveying means mounted on said second trolley means,
whereby by adjusting said circular guide means and said linear guide means, said conveying means can distribute said material to any of an infinite number of discharge points above said receptacles.

6. The conveying system of claim 5, further including a first control means for rotating said linear guide system along said circular guide system, and a second control means for moving said conveying means along said linear guide system.
7. The conveying system of claim 5 wherein said conveyor is reversible so that either end can serve as a discharge end.
8. A conveyor guidance system for distributing material into a plurality of storage receptacles in a horizontal array, comprising:
 - a substantially horizontally oriented circular guide means supported above said plurality of storage receptacles,
 - a substantially horizontally oriented linear guide means supported by said circular guide means,
 - said circular guide means comprising a predetermined diameter and at least a first trolley means, a second trolley means, and a central axis,
 - said first and second trolley means each comprising at least one wheel connecting with at least one rod, said rod being supported by at least one load bar, said load bar of said second trolley means being attached substantially perpendicularly to said load bar of said first trolley means, said wheels of said second trolley means supporting said linear guide means, said first trolley means being movable along said circular guide means,
 - said circular guide means comprising at least one circular track and a first trolley means, said first trolley means comprising at least two wheels, each said wheel connecting to at least one rod, and at least one load bar supporting said rod, at least one of said rods intersecting said central axis of said circular guide without being perpendicular to said central axis, at least one of said rods being perpendicular to central axis,
 - said linear guide means comprising at least one linear horizontal track, and a second trolley means, said second trolley means each comprising at least one wheel and at least one rod,

connecting to said wheel at least one said rod, and at least one load bar supporting said rod,

said load bar of said first trolley means supporting said second trolley means, said second trolley means being attached substantially perpendicularly to said first trolley means, said load bar of said second trolley means supporting said linear guide means, said first trolley means being movable along said circular guide means, said linear guide means being movable along said second trolley means, and said conveying means being mounted on said linear guide means.

a substantially horizontally oriented conveying means mounted to said linear guide means, so that said linear guide means and attached said conveying means move linearly along said second trolley means, and said linear guide means rotates along said circular guide means with said first trolley means,

whereby by adjusting said circular guide means and said linear guide means, said conveying means can distribute said material to any of an infinite number of discharge points above said receptacles, with a minimal amount of linear meters of horizontal conveyor.

9. The conveyor guidance system of claim 8, further including a first control means for rotating said first trolley means along said circular guide means, and a second control means for moving said linear guide means along said second trolley means.

10. The conveyor guidance system of claim 8 wherein said conveying means comprises a conveyor, said conveyor being reversible so that either end can serve as a discharge end.

11. The conveyor guidance system of claim 8 wherein said circular guide system comprises at least one concentric arcuate track and said linear guide system comprises at least one linear track.

2. A method of filling a plurality of storage receptacles, comprising:

- (a) providing a substantially horizontally oriented circular guide system,
- (b) said circular guide means comprises at least one circular track, and a first trolley means, said first trolley means comprising at least two wheels, each said wheel connected to at least one rod, and at least one load bar supporting said rod, at least one of said rods being parallel to circular guide axis, at least one of said rods being perpendicular to circular

guide axis,

- (c) providing a substantially horizontally oriented linear guide system, said linear guide system being mounted to said circular guide system with at least a first trolley means,
- (d) providing a second trolley means, said second trolley means being attached to said conveyor, so that said conveyor shuttles along said linear guide means, said linear guide means being attached directly to said first trolley means. providing a substantially horizontally oriented conveyor, said conveyor being mounted on said linear guide system,
- (f) moving said conveyor laterally along said linear guide system, and rotating said linear guide system along said circular guide system, so as to position a discharging end of said conveyor over a selected receptacle from said plurality of storage receptacles.

13. The method of claim 12, further including a horizontal array of storage receptacles positioned under said circular guide system.

14. The method of claim 12 wherein said circular guide system comprises at least one concentric track.

15. The method of claim 12 wherein said linear guide system comprises at least one linear track.

16. A conveyor guidance system for distributing material into a plurality of storage receptacles in a horizontal array, comprising:

- a substantially horizontally oriented circular guide means supported above said receptacles, said circular guide means having a predetermined diameter;
 - a substantially horizontally oriented linear guide means extending at least the length of said predetermined diameter of said circular guide means and mounted to rotate thereon, and
 - a substantially horizontally oriented conveying means mounted to linear guide means for moving linearly, said conveying means comprising at least one discharge end,
- whereby by adjusting said circular guide means without the use of a central shaft and said linear guide means, said conveying means can distribute said material to any of an infinite number of discharge points above said receptacles, with minimal energy inputs and amount of linear meters of horizontal conveyor.

17. The conveyor guidance system of claim 16 wherein said circular guide means comprises at least one circular track, a first trolley means, and a second trolley means, said first and second trolley means each comprising at least one wheel connected to at least one rod, and at least one load bar supporting said rod, said load bar of said first trolley means supporting said second trolley means, said second trolley means being attached substantially perpendicularly to said first trolley means, said load bar of said second trolley means supporting said linear guide means, said first trolley means being movable along said circular guide means, said linear guide means being movable along said second trolley means, and said conveying means being mounted on said linear guide means.
18. The conveyor guidance system of claim 16 wherein said circular guide means comprises at least one circular track and a first trolley means, said first trolley means comprising at least one wheel and at least one rod, said wheel being connected said rod, and at least one load bar supporting said rod and connecting to said linear guide means, said linear guide means being mounted on said load bar of said first trolley means, said linear guide means comprising a second trolley means that moves linearly along said linear guide means, said second trolley means comprising at least one wheel and at least one rod, said wheel being connected to said rod, and at least one load bar supporting said rod, said conveying means mounting to said load bar of said second trolley means.
19. The conveyor guidance system of claim 16, further including a first control means for achieving rotation of said linear guide system along said circular guide system, and a second control means for achieving linear movement of said conveying means.
20. The conveyor guidance system of claim 16 wherein said conveying means comprises at least one conveyor, said conveyor being reversible so that either end can serve as a discharge end.
21. The conveyor guidance system of claim 16 wherein said conveying means comprises at least one conveyor, said conveyor being uni-directional, so that one end serves as a discharge end and the other end serves as a tail end.

22. A horizontally-oriented, rotating and translating conveying system with an infinite number of discharge points for distributing material to a plurality of horizontally arrayed storage receptacles, comprising:
at least one circular guide system having a first trolley means, said circular guide system comprising at least one circular track,
at least one linear guide system, said linear guide system mounted on said first trolley means, said linear guide system comprising a plurality of parallel linear tracks and a second trolley means connecting to said parallel linear tracks, and
at least one horizontal conveying means mounted on said second trolley means,
whereby by adjusting said circular guide means without the use of a control mechanism at axis of circular guide and said linear guide means, said conveying means can distribute said material to any of an infinite number of discharge points above said receptacles.
23. The conveying system of claim 22 wherein said first and second trolley means comprise wheels with rods, said rods connecting to wheels, said trolley means further comprising load bars, said load bars supporting said rods, said load bar from said first trolley means supporting said linear tracks, said load bar from said second trolley means supporting said conveying means.
24. The conveying system of claim 22, further including a first control means for rotating said linear guide system along said circular guide system, and a second control means for moving said conveying means along said linear guide system.
25. The conveying system of claim 22 wherein said conveyor is reversible so that either end can serve as a discharge end.
26. A conveyor guidance system for distributing material into a plurality of storage receptacles in a horizontal array, comprising:
a substantially horizontally oriented circular guide means supported above said plurality of storage receptacles,
a substantially horizontally oriented linear guide means supported by said circular guide means,

said circular guide means having a predetermined diameter and comprising at least a first trolley means and a second trolley means,
circular motion is guided without the use of a control mechanism at axis of circular guide,
said first and second trolley means each comprising at least one wheel and at least one rod,
said wheel connecting with said rod, said rod being supported by at least one load bar,
said load bar of said second trolley means being attached substantially perpendicularly to
said load bar of said first trolley means, said wheels of said second trolley means
supporting said linear guide means, said first trolley means being movable along said
circular guide means,
a substantially horizontally oriented conveying means mounted to said linear guide means, so
that said linear guide means and attached said conveying means move linearly along said
second trolley means, and
said linear guide means rotates along said circular guide means with said first trolley means,
whereby by adjusting said circular guide means and said linear guide means, said conveying
means can distribute said material to any of an infinite number of discharge points above
said receptacles, with a minimal amount of linear meters of horizontal conveyor.

27. The conveyor guidance system of claim 26, further including a first control means for rotating said first trolley means along said circular guide means, and a second control means for moving said linear guide means along said second trolley means.

28. The conveyor guidance system of claim 26 wherein said conveying means comprises a conveyor, said conveyor being reversible so that either end can serve as a discharge end.

29. The conveyor guidance system of claim 26 wherein said circular guide system comprises at least one concentric arcuate track and said linear guide system comprises at least one linear track.

30. A method of filling a plurality of storage receptacles, comprising:

- (a) providing a substantially horizontally oriented circular guide system,
- (b) providing a substantially horizontally oriented linear guide system, said linear guide system being mounted to said circular guide system with at least a first trolley means,
- (c) providing a substantially horizontally oriented conveyor, said conveyor being mounted on

said linear guide system,

- (d) moving said conveyor laterally along said linear guide system, and rotating said linear guide system along said circular guide system without the use of a central control mechanism, so as to position a discharging end of said conveyor over a selected receptacle from said plurality of storage receptacles.

31. The method of claim 30, further including a horizontal array of storage receptacles positioned under said guide system
32. The method of claim 30 wherein said circular guide system comprises at least one concentric track.
33. The method of claim 30 wherein said linear guide system comprises at least one linear track.
34. The method of claim 30, further including a second trolley means, said second trolley means being fixed to and positioned at about 90 degrees from said first trolley means, said linear guide system being attached to said second trolley means, so that said linear guide means is attached directly to and moves linearly with said conveyor along said second trolley means.
35. The method of claim 30, further including a second trolley means, said second trolley means being attached to said conveyor, so that said conveyor shuttles along said linear guide means, said linear guide means being attached directly to said first trolley means.

Dwight Eric Kinzer

3044 34th St S.W., Fargo, ND 58103 USA
701.356.0754 – process@fmtc.com

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The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Suisse

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Statement Under Article 19

Independent claims 1, 5, 8, 12 have been modified in response to the International Search Report to better clarify the inventive step and novelty of the claims.

Document D1 that is regarded as being the closest priority art to the subject matter of claim 1 as well as document D2 differs from the amended claim in many ways. Item "h" depicted in Fig 1 and Fig 2 of D1 and Item 1 in Fig 1 and Fig 2 of D2 show the circular track pivoting around and/or driven by a fixed central shaft that maintains the axis of the circular track. One of the inventive steps and novelties of all amended Independent claims is the narrowing of each Independent claim with the addition of:

"at least one of said rods being parallel to circular guide axis"

None of the prior art ~~that has been~~ has shown a wheel or plurality of wheels with the supporting rod(s) parallel or other than perpendicular to the axis of the circular track. This is of significant importance because:

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